

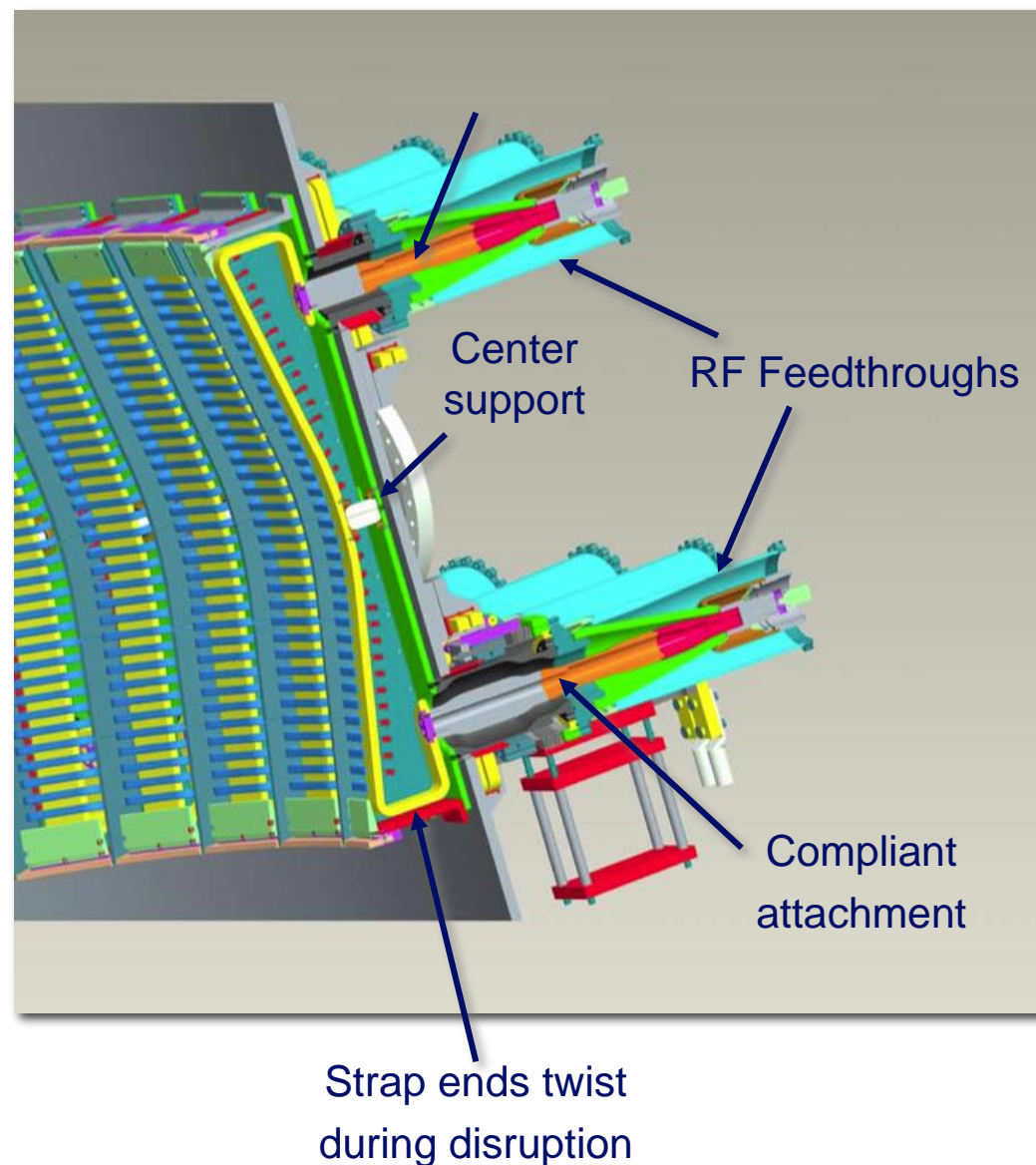
NSTX-U HHFW System and Diagnostic Enhancements

Joel Hosea

NSTX-U Facility Enhancement Brainstorming Meeting

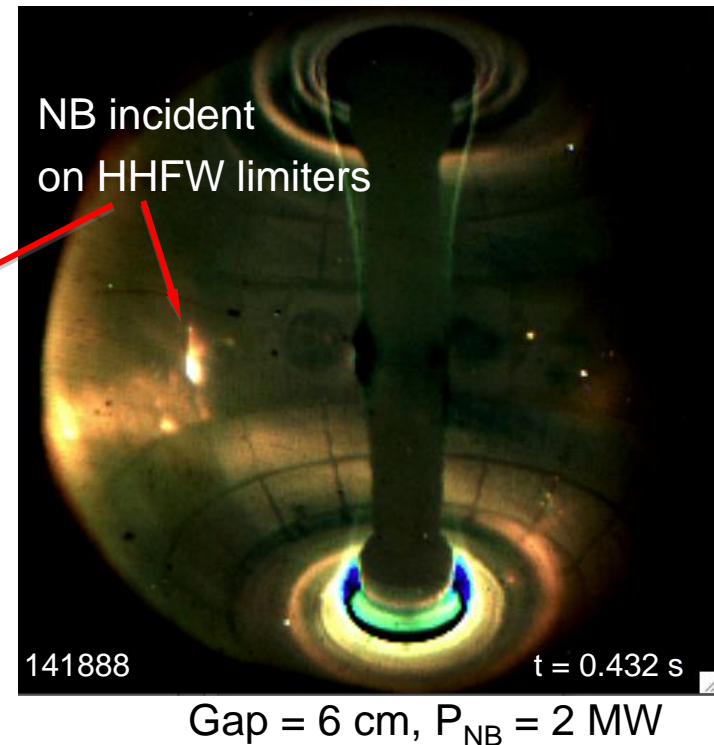
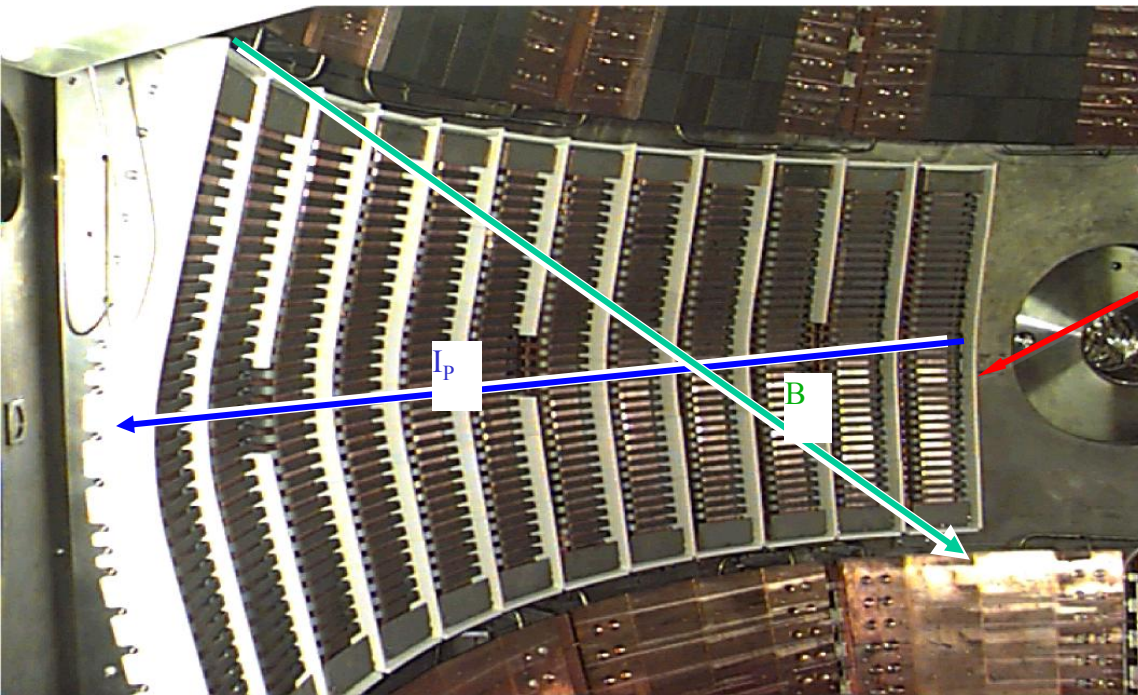
February 7, 2012

Antenna improvements needed



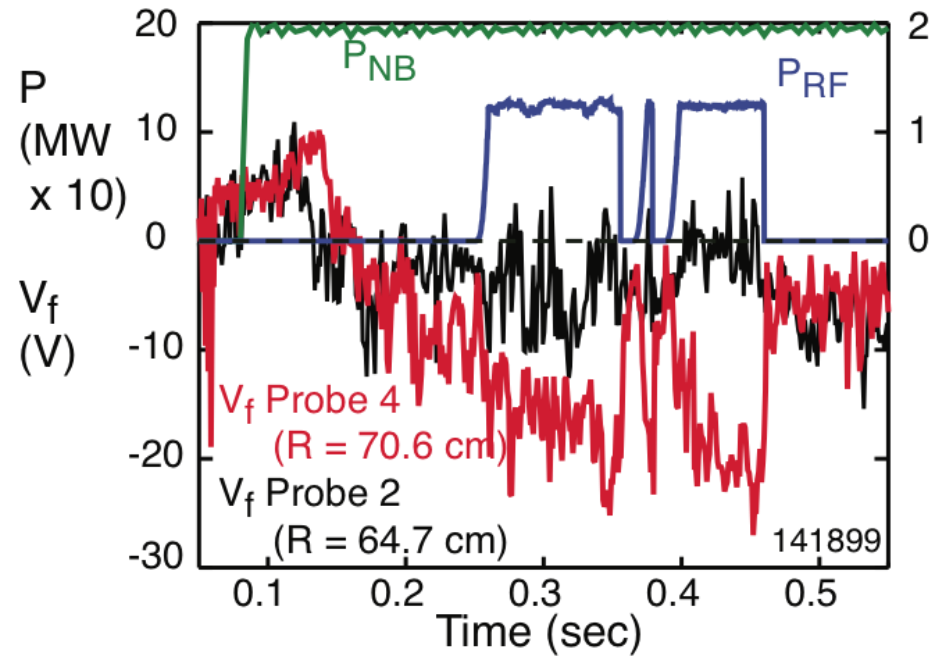
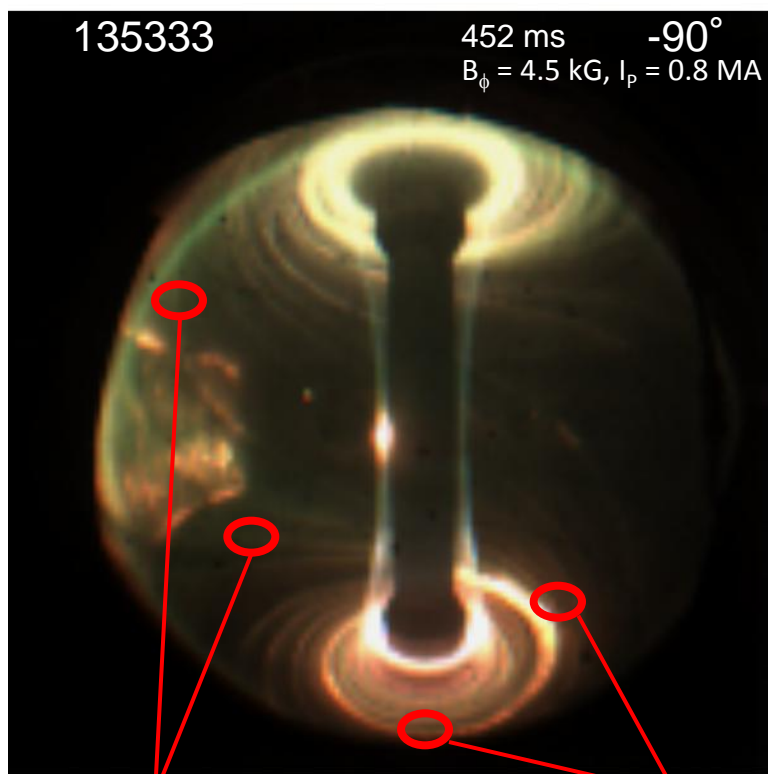
- Compliant attachments between antenna current straps and feedthroughs are required
 - $B_T \times 2, I_p \times 2 \Rightarrow 4 \times$ disruption load on strap
 - Compliant bellows being considered as first concept
 - Must be RF voltage tested on test stand to assure voltage standoff for 24 compliant attachments
- Need to improve antenna voltage standoff generally to support 5 MW operation with 8 straps in second phase of NSTX-U
 - Two antenna elements are to be tested on the test stand
 - Voltage to be improved in vacuum with aid of Microwave Studio

NSTX HHFW antenna limiter should be made more robust for high beam power operation



- Boron nitride limiter is impacted by beam ions with 6 cm antenna-plasma gap at modest density
 - P_{NB} in upgrade will be up to 12 MW with a large fraction deposited off-axis
- Would like to keep gap size to insure power coupling to core
 - If antenna voltage standoff can be increased, a larger gap can be used to keep energetic beam ions off the antenna limiter

IR cameras and probes are critical for documenting properties of RF edge heating to compare to advanced RF codes for SOL



Bay B Langmuir probe measures effect of RF when the spiral is over it (Jaworski)

Protective tile probes Langmuir probes
(30 MHz response)

- Need probes in protective tiles under and above antenna and in same vertical locations away from field lines that pass in front of the antenna
 - What is RF deposition along the path of the RF power flow to the divertor regions along the magnetic field lines?